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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/582,629

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Gilles Feugnet

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EXAMINER

COOK, JONATHON

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/582,629	Applicant(s) FEUGNET ET AL.	
	Examiner JONATHON D. COOK	Art Unit 2886	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/12/2006 & 7/17/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

Claim Objections

Claim 1 is objected to because of the following informalities:

In **Claim 1**, the limitation "the amplifying medium is anisotropic and in that the feedback system includes, inside the cavity," The phrase, "and in that" is awkward and confusing and the limitation should be changed to clarify the metes and bounds. For purposes of examination the examiner shall interpret the limitation to read, "wherein the amplifying medium is anisotropic and the feedback system includes, inside the cavity, ... "

With regard to **claim 1**, language that does not limit a claim limitation to a particular structure does not limit the scope of the claim. It has been held that the recitation that an element is "being intended", "adapted to", "configured to", "designed to", or "operable to" perform a function is not a positive limitation but only requires the ability to so perform and does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 139.

Further, the phrase "being intended" is overly broad and vague and does not set forth proper metes and bounds of the claim. Therefore, for purposes of prosecution the functional language that follows the aforementioned phrase will not be considered limiting.

In Claim 10, the limitation of, "the amplifying medium and the material exhibiting the Faraday effect are produced in the same material" is poorly worded. The examiner believes what is meant is that the amplifying medium and the material exhibiting the

Faraday effect are integral. For purposes of prosecution the examiner shall construe this limitation as stated.

Appropriate correction is required.

Information Disclose Statement

The information disclosure statement filed 7/17/2007 fails to comply with 37 CFR 1.98(a)(1), which requires the following: (1) a list of all patents, publications, applications, or other information submitted for consideration by the Office; (2) U.S. patents and U.S. patent application publications listed in a section separately from citations of other documents; (3) the application number of the application in which the information disclosure statement is being submitted on each page of the list; (4) a column that provides a blank space next to each document to be considered, for the examiner's initials; and (5) a heading that clearly indicates that the list is an information disclosure statement. The information disclosure statement has been placed in the application file, but the information referred to therein has not been considered. Applicant is advised to resubmit this IDS on form 1449.

The information disclosure statement filed 6/12/2006 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. The French document cited in the IDS was not submitted for the examiners inspection.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. Claims 1 & 6-8 rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 & 10 of U.S. Patent No. 7,230,686 (686) in view of **Hackell** (US PAT 5,022,033) (Hackell).

Regarding **Claims 1 & 8**, (686) claims in claim 1 a gyrolaser, comprising:

a ring-shaped cavity;

a solid-state amplifying medium;

a second propagation mode propagating in a first direction and a fourth propagation mode propagating in the opposite direction;

a slaving device (applicant's feedback system) including a first optical assembly made up of a nonreciprocal optical rotator and an optical element that acts on the polarization state of the counter-propagating modes;

(686) fails to disclose the solid-state amplifying medium is anisotropic;

However, Hackell teaches using a gain medium (**12**) that is anisotropic;

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to modify (686) with the anisotropic gain medium because it would allow you to only amplify the light of a specific angle of polarization which improves overall signal to noise ratio when detecting the light.

Regarding **Claim 6**, (686) in claim 10 claims the optical element being either a reciprocal optical rotator or a birefringent element, with at least one of the effects or the birefringence being adjustable.

Regarding **Claim 7**, (686) in claim 1 claims the use of a nonreciprocal optical rotator but not it acting on the polarization state of the counter-propagating modes in a fixed manner and comprising a material exhibiting the faraday effect polarized by a permanent magnet;

However, Hackell teaches creating a magnetic field, a solenoid permanent magnet (**34**) is positioned annularly surrounding the glass of the Faraday rotator (**30**) so that it applies a dc magnetic field through the rotator (**30**) (**Column 8, lines 2-5**);

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to modify (686) with it acting on the polarization state of the counter-propagating modes in a fixed manner and comprising a material exhibiting the

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faraday effect polarized by a permanent magnet because it is one way of many to enact such polarization and by making the rotator fixed and it simplifies the device and reduces disturbance that might be caused by changing the direction if polarizes the light in.

2. Claims 1, 7, & 8 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 & 9 of copending Application No. 10/550,514 (514) in view of **Hackell**.

Regarding **Claims 1 & 8**, (514) in claim 1 claims a laser gyroscope, comprising:
an optical ring cavity including at least three mirrors, a solid-state amplifying medium and a feedback system, the cavity and the amplifying medium being such that two counterpropagating optical modes can propagate in opposite directions one with respect to the other inside said optical cavity, the feedback system allowing the intensity of the two counterpropagating modes to be kept almost the same, the feedback system comprising, inside the cavity, an optical assembly including a polarizing element and a device exhibiting a nonreciprocal effect that acts on the polarization state of the counterpropagating modes, wherein said optical assembly further includes a device exhibiting a reciprocal effect that also acts on the polarization state of the counterpropagating modes, the feedback system comprising control means for controlling at least one of the effects of said devices

(514) fails to disclose the solid-state amplifying medium is anisotropic;

However, Hackell teaches using a gain medium (**12**) that is anisotropic;

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to modify (514) with the anisotropic gain medium because it would allow you to only amplify the light of a specific angle of polarization which improves overall signal to noise ratio when detecting the light.

Regarding **Claim 7**, (514) in claim 9 claims wherein, when the device exhibiting a nonreciprocal effect consists of a material exhibiting the Faraday effect and polarized by a permanent magnet, the feedback system consists of means for adjusting the reciprocal effect of the device exhibiting a reciprocal effect.

(514) fails to disclose the nonreciprocal effect acts on the polarization state of the counter-propagating modes in a fixed manner;

However, from the claim it is obvious to one of ordinary skill in the art that the effect would be in a fixed manner;

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to modify (514) with it acting on the polarization state of the counter-propagating modes in a fixed manner because by making the rotator fixed and it simplifies the device and reduces disturbance that might be caused by changing the direction if polarizes the light in.

This is a provisional obviousness-type double patenting rejection.

3. Claims 1 & 6-8 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/526,610 (610) in view of **Hackell**.

Regarding **Claims 1 & 8**, (610) in claim 1 claims a gyrolaser, comprising:

a ring-shaped cavity;

a solid-state amplifying medium;

a second propagation mode propagating in a first direction and a fourth propagation mode propagating in the opposite direction;

a slaving device (applicant's feedback system) including a first optical assembly made up of a nonreciprocal optical rotator and an optical element that acts on the polarization state of the counter-propagating modes;

(610) fails to disclose the solid-state amplifying medium is anisotropic;

However, Hackell teaches using a gain medium (**12**) that is anisotropic;

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to modify (610) with the anisotropic gain medium because it would allow you to only amplify the light of a specific angle of polarization which improves overall signal to noise ratio when detecting the light.

Regarding **Claim 6**, (610) in claim 1 claims the optical element being either a reciprocal optical rotator or a birefringent element, with at least one of the effects or the birefringence being adjustable

Regarding **Claim 7**, (610) in claim 1 claims the use of a nonreciprocal optical rotator but not it acting on the polarization state of the counter-propagating modes in a fixed manner and comprising a material exhibiting the faraday effect polarized by a permanent magnet;

However, Hackell teaches creating a magnetic field, a solenoid permanent magnet (34) is positioned annularly surrounding the glass of the Faraday rotator (30) so that it applies a dc magnetic field through the rotator (30) (**Column 8, lines 2-5**);

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to modify (686) with it acting on the polarization state of the counter-propagating modes in a fixed manner and comprising a material exhibiting the faraday effect polarized by a permanent magnet because it is one way of many to enact such polarization and by making the rotator fixed and it simplifies the device and reduces disturbance that might be caused by changing the direction if polarizes the light in.

This is a provisional obviousness-type double patenting rejection.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 8, & 9 are rejected under 35 U.S.C. 102(b) as being anticipated by **Hackell** (US PAT 5,022,033) (Hackell).

Regarding **Claims 1, 8, & 9**, Hackell discloses and shows in **fig. 2** a ring laser having an output at a single frequency, comprising:

any typical stable ring cavity design (applicant's optical ring cavity) may provide a suitable design for the resonator **(10)** (**Column 6, lines 32-34**);

gain material **(12)** (applicant's anisotropic solid-state amplifying medium) which is a block of solid state laser material, preferably Nd:YLF, shaped in the form of a rod (**Column 5, lines 63-65**);

optical diode **(16)** (applicant's feedback system);

the optical diode **(16)** restricts the beam in the resonator **(10)** to light traveling in one direction (**Column 6, lines 7-9**). Inherently this means there are at least two optical modes traveling in opposite directions;

the optical diode **(16)** includes an optical assembly comprising a compensator **(36)** (applicant's optical element) that acts on the polarization state of the counter-propagating modes and a Faraday Rotator **(30)** (applicant's rotor). The Faraday rotator **(30)** comprises a material that rotates the angle of polarization independent of the direction of wave propagation. Specifically, the Faraday rotator **(30)** comprises a transparent material that has a finite Verdet constant when placed in a dc magnetic field. To create a magnetic field, a solenoid permanent magnet **(34)** (applicant's induction coil) is positioned annularly surrounding the glass of the Faraday rotator **(30)** so that it applies a dc magnetic field through the rotator **(30)**. When a polarized optical wave passes through the rotator **(30)**, its polarization is rotated about the optical axis, the rotation being in a direction that depends upon the applied magnetic field (applicant's adjustable nonreciprocal effect) but not on the direction of travel of the wave (**Columns 7 & 8, lines 65-68 & 1-10**).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 2-7 & 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hackell**.

Regarding **Claims 2-5**, Hackell discloses compensator **(36)** is also included in the optical diode **(16)**. The compensator **(36)** comprises a material, such as optically active quartz that rotates the angle of polarization (applicant's linear polarizer that is a birefringent optical plate from a naturally birefringent material made of quartz) (**Column 8, lines 11-14**), further while the compensator rotates the angle of polarization of the light in a direction depending on the direction the light is propagating in it always rotates it by the same amount, and therefore rotates it in a fixed manner;

Hackell fails to explicitly disclose that the polarization direction the compensator imparts is not parallel to the direction of the maximum gain of the amplifying medium;

However, it would be within the capability of one of ordinary skill in the art to set up the compensator into such a configuration, and it is disclosed to adjust the angle;

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the polarization angle accordingly , since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. It would be desirable to do so to attain an angle at which minimum loss was obtained from the system (**Column 9, lines 4-8**).

Regarding **Claim 6**, Hackell discloses to tune the axial position of the compensator **(36)** so that it provides the appropriate amount of rotation, it was placed at normal incidence to the beam, and rotated around its axis during operation of the laser

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until minimum loss was obtained (applicant's acting on the polarization state in an adjustable manner) (**Column 9, lines 4-8**);

Hackell fails to explicitly disclose that the element is an optical plate exhibiting electrically controlled birefringence;

However, the examiner takes official notice that such a device is well known to one of ordinary skill in the art;

Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify Hackell with the optical plate exhibiting electrically controlled birefringence because one could tune the polarization angle of the device without physically moving the device which would reduce vibration in it the machine and thus reduce stray light scattering caused by the vibration.

Regarding **Claim 7**, Hackell discloses the aforementioned but fails to disclose the nonreciprocal effect acts on the polarization state of the counter-propagating modes in a fixed manner;

However, it would be easily obtainable for one of ordinary skill in the art to arrange the device to operate in such a fashion;

Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify Hackell with the nonreciprocal effect acts on the polarization state of the counter-propagating modes in a fixed manner because with the compensator adjusting to optimize the angle of polarization to attain minimum loss it would not be required the rotator to be adjustable and by having a fixed angle of

polarization the machine would be less complex, and thus have less room for error, and less costly to construct.

Regarding **Claim 10**, Hackell discloses the aforementioned but fails to disclose the amplifying material and the material exhibiting the Faraday effect are integral;

However, one of ordinary skill in the art is easily capable of such integration;

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the amplifying material and the material exhibiting the Faraday effect are integral, since it has been held that integrating previously known parts without producing any new and unexpected result involves only routine skill in the art. In re Larson 340 f.2d 965 144 USPQ 347 (CCPA 1965). By making the two pieces integral you improve the overall integrity of the device by having less pieces which may become misaligned.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Hackell** in view of **Kane et al** (US PAT 4,578,793) (Kane).

Regarding **Claim 11**, Hackell discloses the aforementioned but fails to disclose the cavity is monolithic;

However, Kane teaches and shows in **fig. 3a** a solid-state non-planar internally reflecting ring laser, comprising:

a solid-state non-planar internally reflecting ring laser incorporating all the elements of the conventional laser in a single element or prism (applicant's monolithic cavity) which may be a ND:YAG crystal having properly ground surfaces (**Column 4, lines 54-58**);

Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify Hackell with the cavity being monolithic because a laser resonator being monolithic is of relatively simple construction and thus less prone to alignment and mechanical stability issues (**Column 1, lines 37-45**), as taught in Kane.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHON D. COOK whose telephone number is (571)270-1323. The examiner can normally be reached on Mon-Fri 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury can be reached on (571)272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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June 6th, 2008

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